

Effectiveness of Sodium Creatine Phosphate Combined with Immunoglobulin in the Treatment of Patients with Viral Myocarditis

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Abstract: *Objective:* To study the effect of using sodium creatine phosphate combined with immunoglobulin therapy in the treatment of patients with viral myocarditis. *Methods:* Fifty-six cases of viral myocarditis patients were selected and randomly grouped, with 28 cases in each group. The study group underwent treatment using sodium creatine phosphate combined with immunoglobulin, while the control group underwent treatment using immunoglobulin. The outcome differences were compared. *Results:* After treatment, the study group showed significantly better cardiac function indexes, significantly lower myocardial enzyme spectrum indexes, significantly lower inflammatory mediator levels, and significantly shorter clinical symptom disappearance time as well as recovery time of myocardial enzyme spectrum as compared to the control group ($P < 0.05$). *Conclusion:* The effect of using sodium creatine phosphate combined with immunoglobulin in the process of treating patients with viral myocarditis is ideal.

Keywords: Creatine phosphate; Immunoglobulin; Viral myocarditis; Effects

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1. Introduction

Viral myocarditis is a type of cardiovascular disease in which the virus invasion leads to the patient's heart function being affected. The main clinical symptoms include fever, palpitations, respiratory tract infection, etc., and severe cases may even lead to sudden death. Currently, there is no effective method to treat the condition of patients with viral myocarditis^[1], as its clinical treatment is difficult. The implementation of comprehensive treatment for patients is essential, with its main objective of inhibiting viral replication and strengthening the patient's body immunity. Clinical research showed that sodium creatine phosphate can stabilize the cell membrane and has antioxidant properties, but its single-use effect is unsatisfactory. Immunoglobulin was found to strengthen immune function, reduce viral differentiation, and improve the patient's myocardial injury. In

this paper, 56 patients were selected to study the effect of using sodium creatine phosphate combined with immunoglobulin in the treatment of patients with viral myocarditis.

2. Materials and methods

2.1. General information

Fifty-six patients with viral myocarditis were recruited between January and December 2023, which were then grouped into study and control groups with 28 cases each using drawing lots. There were 19 males and 9 females in the study group, with an age range of 6–14 years and a mean age of 9.22 ± 2.66 years, while there were 18 males and 10 females in the control group, with an age range of 5–15 years and a mean age of 9.21 ± 2.65 years. There was no significant difference in gender and age ($P > 0.05$).

2.2. Methods.

The control group received immunoglobulin treatment with a 50 mg intravenous drip once daily. The study group received sodium creatine phosphate combined with immunoglobulin treatment, with a 50 mg immunoglobulin intravenous drop once daily and 300 mg sodium creatine phosphate intramuscular injection once daily. Both groups received treatment for two weeks.

2.3. Observation indexes

The cardiac function indexes after treatment, cardiac enzyme spectrum indexes after treatment, inflammatory mediator levels after treatment, clinical symptoms disappearance time, and cardiac enzyme spectrum recovery time of the control and study groups were compared.

2.4. Statistical analysis

Statistical analysis was carried out using SPSS 25.0 software, data were expressed as [n (%)] and mean \pm standard deviation (SD), with the implementation of χ^2 test and t -test. A P value of less than 0.05 indicated a statistically significant difference.

3. Results

Tables 1 to 4 show that after treatment, the study group had significantly better cardiac function indexes, significantly lower myocardial enzyme profile indexes, significantly lower inflammatory mediator levels, and significantly shorter clinical symptom disappearance time and recovery time of myocardial enzyme profile as compared to the control group ($P < 0.05$).

Table 1. Comparison of cardiac function indexes after treatment (mean \pm SD)

| Group | Ventricular ejection fraction (%) | Ratio of peak early mitral diastolic blood flow velocity to peak late mitral diastolic blood flow velocity | Ventricular short-axis shortening (%) |
|----------------------------|-----------------------------------|--|---------------------------------------|
| Study group ($n = 28$) | 65.67 ± 5.74 | 0.50 ± 0.05 | 33.14 ± 5.22 |
| Control group ($n = 28$) | 57.76 ± 4.88 | 0.57 ± 0.08 | 26.74 ± 4.77 |
| t value | 5.5555 | 3.9263 | 4.7893 |
| P value | < 0.05 | < 0.05 | < 0.05 |

Table 2. Comparison of myocardial enzyme profile indexes after treatment (mean ± SD; IU/L)

| Group | Lactate dehydrogenase | Creatine kinase | Aspartate aminotransferase | Creatine kinase isoenzyme |
|--------------------------------|-----------------------|-----------------|----------------------------|---------------------------|
| Study group (<i>n</i> = 28) | 57.48 ± 11.62 | 142.05 ± 19.52 | 29.48 ± 1.77 | 25.88 ± 4.36 |
| Control group (<i>n</i> = 28) | 76.51 ± 15.57 | 252.12 ± 27.47 | 34.01 ± 2.42 | 37.33 ± 6.37 |
| <i>t</i> value | 5.1831 | 17.2834 | 7.9949 | 7.8489 |
| <i>P</i> value | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

Table 3. Comparison of inflammatory mediator levels after treatment (mean ± SD; ng/L)

| Group | IL-6 | IL-8 | CRP | TNF- α |
|--------------------------------|-------------|-------------|-------------|---------------|
| Study group (<i>n</i> = 28) | 0.15 ± 0.07 | 1.04 ± 0.11 | 3.58 ± 1.02 | 13.84 ± 2.04 |
| Control group (<i>n</i> = 28) | 0.25 ± 0.12 | 1.38 ± 0.22 | 6.77 ± 1.85 | 20.35 ± 2.82 |
| <i>t</i> value | 3.8089 | 7.3144 | 7.9903 | 9.8973 |
| <i>P</i> value | < 0.05 | < 0.05 | < 0.05 | < 0.05 |

Table 4. Comparison of the time of disappearance of clinical symptoms and the time of recovery of cardiac enzyme spectrum (mean ± SD; d)

| Group | Time to the disappearance of clinical symptoms | Recovery time of myocardial enzyme profile |
|--------------------------------|--|--|
| Study group (<i>n</i> = 28) | 11.06 ± 2.61 | 23.52 ± 2.78 |
| Control group (<i>n</i> = 28) | 18.02 ± 2.36 | 34.66 ± 3.71 |
| <i>t</i> value | 10.4664 | 12.7151 |
| <i>P</i> value | < 0.05 | < 0.05 |

4. Discussion

Patients with viral myocarditis have a more complex pathogenesis, in which a large number of inflammatory cytokines are released in the patient's body, causing continuous damage to cardiomyocytes and leading to cardiac dysfunction.

Clinical practice has confirmed the high feasibility of using sodium creatine phosphate combined with immunoglobulin therapy in the treatment of patients with viral myocarditis [2,3]. The implementation of the combination of drugs for patients provides myocardial nutrition to patients, significantly reduces the damage to patients' cardiomyocytes, avoids further apoptosis, increases the amount of blood transfusion to the patient's heart, and promotes the significant improvement of patient's symptoms [4-6], thereby significantly improving the effect of patient recovery. With various drug combinations, damaged cardiomyocytes were effectively repaired, and immune function was promoted significantly [7-10].

This study concluded that compared to the control group, the study group's cardiac function indexes were significantly better after treatment, the cardiac enzyme spectrum indexes were significantly lower after treatment, the inflammatory mediator level was significantly lower after treatment, and the time for clinical symptoms to disappear as well as the time for cardiac enzyme spectrum to recover was significantly shorter ($P < 0.05$). It was concluded that the inflammatory response was involved in the disease occurrence and development, and aggravation of the patient's condition would significantly increase the level of inflammatory mediators. Therefore, the monitoring of these data changes can be used in the assessment of clinical treatment effectiveness, as well as in the assessment of patient prognosis. After the implementation of the combination of drugs given to the patient, the patient's cardiac enzymes were reduced, and cardiac function was restored,

thus proving that the drug was safe to use. The use of the two drugs will synergize the effect of synergistic action, and significantly strengthen the clinical therapeutic effect on patients. The use of sodium creatine phosphate can provide a large amount of myocardial energy, promote the maintenance of normal physiological functions, protect the patient's cardiomyocytes, and effectively restore the patient's cardiac function. The use of immunoglobulin can remove the virus from the patient's body and promote the effective recovery of the patient.

In conclusion, the use of sodium creatine phosphate combined with immunoglobulin in the treatment of patients with viral myocarditis has an ideal effect, with significantly better cardiac function indexes, significantly lower myocardial enzyme indexes, significantly lower inflammatory mediator levels, significantly shorter clinical symptom disappearance time and myocardial enzyme recovery time, which is worth promoting in the clinic.

Disclosure statement

The authors declare no conflict of interest.

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